

IN THE CLAIMS:

Please amend the claims as set forth below:

1. (Currently Amended) A way predictor comprising:

- a decoder configured to decode an indication of a first address that is to access a cache for a current cache access, the decoder configured to select a set responsive to the indication of the first address;
- a memory coupled to the decoder, wherein the memory is configured to output a plurality of values from the set in response to the decoder selecting the set, wherein each of the plurality of values corresponds to a different way of a plurality of ways of the memory, wherein the cache includes a same number of ways as the memory, and wherein the cache includes a tag memory storing a plurality of tags corresponding to cache lines stored in the cache and a data memory storing the cache lines, wherein each of the plurality of values comprises a plurality of bits associated with a corresponding cache line stored in the cache in a respective way of the plurality of ways and in the set; and
- a circuit coupled to receive the plurality of values and a first value corresponding to the first address, wherein the circuit is configured to compare the first value to the plurality of values, and wherein a match of the first value and a second value stored in a first way of the plurality of ways causes the circuit to predict the first way ~~predict a first way of the plurality of ways~~ to be a hit in the cache for the first address for the current access, and responsive to the first value matching one of the plurality of values, and wherein the first way of the plurality of ways in the memory stores the one of the plurality of values wherein the circuit is configured to output a way identifier identifying the first way to the data memory, the way identifier used by the data memory to select the first way to output data, and

wherein the circuit is configured to construct the way identifier based on the comparisons of the first value to the plurality of values.

2. (Cancelled)
3. (Currently Amended) The way predictor as recited in claim 1 ~~claim 2~~ wherein the circuit, if none of the plurality of values matches the first value, is configured to assert an early miss signal.
4. (Original) The way predictor as recited in claim 1 wherein each of the plurality of values comprises a portion of a tag identifying a corresponding cache line in the cache, the portion excluding at least one bit of the tag.
5. (Original) The way predictor as recited in claim 1 wherein each of the plurality of values is derived from at least a portion of the indication of the address identifying a corresponding cache line.
6. (Original) The way predictor as recited in claim 5 wherein each of the plurality of values comprises a portion of one or more address operands used to generate the address.
7. (Original) The way predictor as recited in claim 5 wherein at least one bit of one of the plurality of values is a logical combination of two or more bits of the address.
8. (Original) The way predictor as recited in claim 5 wherein at least one bit of one of the plurality of values is a logical combination of two or more bits of one or more address operands used to generate the address.
9. (Original) The way predictor as recited in claim 1 wherein the indication of the first address comprises at least a portion of the first address.
10. (Previously Presented) The way predictor as recited in claim 1 wherein the indication

of the first address comprises two or more address operands used to generate the first address.

11. (Previously Presented) The way predictor as recited in claim 1 wherein, if the first way is an incorrect prediction, the cache is configured to replace a cache line in the first way with a missing cache line corresponding to the first address.

12. (Original) The way predictor as recited in claim 11 wherein, if no way prediction is generated and a cache miss results for the first address, the cache is configured to use a replacement algorithm to select the cache line to be replaced with the missing cache line.

13. (Currently Amended) A method comprising:

decoding an indication of a first address that is to access a cache to select a set;

outputting a plurality of values from the set in a memory in response to the set being selected, wherein each of the plurality of values corresponds to a different way of a plurality of ways of the memory, wherein the cache includes a same number of ways as the memory, and wherein the cache includes a tag memory storing a plurality of tags corresponding to cache lines stored in the cache and a data memory storing the cache lines, and wherein each of the plurality of values comprises a plurality of bits associated with a corresponding cache line stored in the cache in a respective way of the plurality of ways and in the set; ~~and~~

comparing each of the plurality of values to the first value, and wherein a hit in a first way of the cache is indicated for prediction based on a match of the first value and a second value stored in the first way of the memory;

predicting ~~a first~~ the first way of the plurality of ways to be a hit in the cache for the first address responsive to the first value matching one of the plurality

~~of values; and values, and wherein the first way of the plurality of ways in the memory stores the one of the plurality of values~~

constructing a way identifier that identifies the first way to the data memory, the way identifier used by the data memory to select the first way to output data, and wherein the constructing is based on the comparisons of the first value to the plurality of values.

14. (Cancelled)

15. (Currently Amended) The method as recited in claim 13 ~~claim 14~~ further comprising, if none of the plurality of values matches the first value, indicating a miss.

16. (Original) The method as recited in claim 13 wherein each of the plurality of values comprises a portion of a tag identifying a corresponding cache line in the cache, the portion excluding at least one bit of the tag.

17. (Original) The method as recited in claim 13 wherein each of the plurality of values is derived from at least a portion of the indication of the address identifying a corresponding cache line.

18. (Original) The method as recited in claim 17 wherein each of the plurality of values comprises a portion of one or more address operands used to generate the address.

19. (Original) The method as recited in claim 17 wherein a bit of each of the plurality of values is a logical combination of two or more bits of the address.

20. (Original) The method as recited in claim 17 wherein a bit of each of the plurality of values is a logical combination of two or more bits of one or more address operands used to generate the address.

21. (Previously Presented) The method as recited in claim 13 further comprising:

detecting that the first way is an incorrect prediction; and

replacing a cache line in the cache in the first way with a missing cache line corresponding to the first address.

22. (Original) The method as recited in claim 21 further comprising, if no way prediction is generated and a cache miss results for the first address, using a replacement algorithm to select the cache line to be replaced with the missing cache line.

23. (Currently Amended) An apparatus comprising:

a way predictor comprising:

a decoder configured to decode an indication of a first address that is to access a cache for a current cache access, the decoder configured to select a set responsive to the indication of the first address;

a memory coupled to the decoder, wherein the memory is configured to output a plurality of values from the set in response to the decoder selecting the set, wherein each of the plurality of values corresponds to a different way of a plurality of ways of the memory, wherein the cache includes a same number of ways as the memory, and wherein the cache includes a data cache tag memory storing a plurality of tags corresponding to cache lines stored in the cache and a data cache data memory storing the cache lines, wherein each of the plurality of values comprises a plurality of bits associated with a corresponding cache line in the cache in a respective way of the plurality of ways and in the set; and

a first circuit coupled to receive the plurality of values and a first value corresponding to the first address, wherein the first circuit is configured to compare the first value to the plurality of values, and wherein a match of the first value and a second value stored in a first way of the plurality of ways causes the first circuit to predict the first way ~~predict a first way of the plurality of ways~~ to be a hit in the cache for the first address for the current access, and responsive to the first value matching one of the plurality of values, and wherein the first way of the plurality of ways in the memory stores the one of the plurality of values wherein the first circuit is configured to output a way identifier identifying the first way to the data cache data memory, the way identifier used by the data cache data memory to select the first way to output data, and wherein the first circuit is configured to construct the way identifier based on the comparisons of the first value to the plurality of values; and

the data cache data memory coupled to the way predictor, wherein the data cache data memory is arranged into the plurality of ways, and wherein the data cache data memory is configured to output data from the first way, and wherein the data cache data memory includes a second circuit configured to reduce power consumption attributable to one or more non-predicted ways of the plurality of ways.

24. (Previously Presented) The apparatus as recited in claim 23 further comprising the data cache tag memory configured to output a tag from the first way and to not output tags from the one or more non-predicted ways.

25. (Previously Presented) The apparatus as recited in claim 23 wherein the second circuit is configured to generate separate wordlines for each of the plurality of ways in the data cache data memory, and wherein the second circuit is configured to activate a

first wordline to the first way and to not activate word lines to the non-predicted ways.

26. (Previously Presented) The apparatus as recited in claim 25 wherein the second circuit includes column multiplexor circuitry coupled to the plurality of ways and configured to select the output of the first way as input to a sense amplifier circuit, wherein the column multiplexor circuitry is controlled by the predicted first way.

27. (Previously Presented) The apparatus as recited in claim 23 wherein the second circuit includes column multiplexor circuitry coupled to the plurality of ways and configured to select the output of the first way as input to a sense amplifier circuit, wherein the column multiplexor circuitry is controlled by the predicted first way.

28. (Previously Presented) The apparatus as recited in claim 23 wherein the second circuit comprises a plurality of sense amplifier circuits, wherein each of the plurality of sense amplifier circuits is coupled to a respective one of the plurality of ways, and wherein each of the plurality of sense amplifier circuits includes an enable input that is controlled by the predicted first way.

29. (Previously Presented) The apparatus as recited in claim 23 further comprising a second level cache, and wherein the circuit is configured to detect a miss responsive to the plurality of values and the first value prior to the miss being detected in the cache that corresponds to the data cache data memory, and wherein the circuit is configured to signal the miss to the second level cache, and wherein the second level cache is configured to begin an access corresponding to the first address responsive to signal from the circuit.